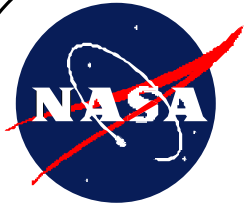


Earth Systems Science Pathfinder (ESSP) PI Mission Management NIAT

Washington Sheraton

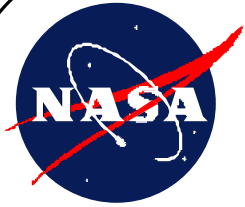
November 15-16, 2001



Outline



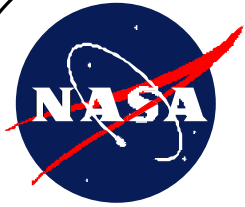
- ☐ PI Mode Roles and Responsibilities
- ☐ PI Mode Strategies
- ☐ PI Mode Reviews
- ☐ PI Mode Lessons Learned
- ☐ Websites



ESSP PI Mode Roles and Responsibilities



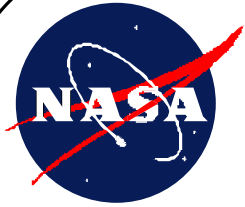
- ☐ The Principal Investigator (PI) is responsible for the overall success of the Project and is accountable to the AA/OES for the scientific success and to the Center Director for the programmatic success and safety.
- ☐ The GSFC Program Management Council (PMC) is the governing PMC for the ESSP Project.
- ☐ The GSFC Center Director is responsible for recommending confirmation and certifying flight readiness to the Associate Administrator.
- ☐ GSFC is responsible for ensuring the PI takes the appropriate actions to achieve mission success within his/her committed cost, schedule, and safety reliability & quality assurance requirements.



ESSP PI Mode Roles and Responsibilities (cont'd):



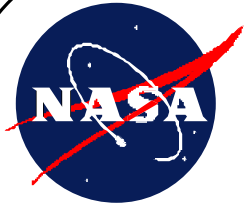
- ☐ The NASA Project Manager is the COTR and a member of the PI's project team.
- ☐ NASA system engineering participates as part of reviews and with the PI's engineering team, as requested.
- ☐ Ad hoc NASA discipline engineering supports the NASA Project Manager and PI, as requested, with technical insight and troubleshooting.
- ☐ NASA Project Manager recommends courses of action and helps obtain government resources when requested.
- ☐ NASA resource and business staff help maintain insight and provide recommendations through contract analysis and personal contacts.
- ☐ The Program provides insight to NASA management through monthly reviews, weekly reporting, timely notification of problems/resolution plans, and involvement in special reviews.



PI Mode Strategies

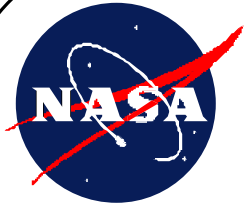


- ☐ Cost Capped Missions - Total mission life cycle costs are capped. PI is free to move \$ across major elements and mission phases. Missions are constrained only by science requirements and assurance of a launch vehicle. If at any time a mission is projected to exceed its cost cap, the PI is expected to execute descope options or to recommend cancellation. NASA will hold a program review and decide if a cancellation review should be held.
- ☐ Minimum Science Mission and Descope Plan - PI defines and NASA concurs on the minimum acceptable science mission that is worth the investment. PI defines descope plan that will be exercised if funds or schedule prove inadequate to solve development problems. This is the ultimate mission margin.



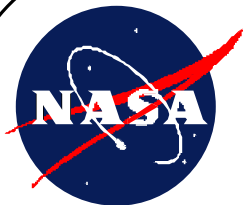
PI Mode Reviews

- ☐ The PI is responsible for Peer Reviews and to provide the results to the System Level Reviews.
- ☐ GSFC is responsible for System Level Reviews and will assist in peer reviews as requested.
- ☐ The PI is required to staff the Peer Reviews with independent, experienced, experts from outside the PI Team as well as Team members.
- ☐ Hold lots of peer reviews with outside folks, document these, along with action items, and how they were resolved.



PI Mode Lessons Learned

- ☐ During step-2 phase, address and correct weaknesses identified during Step-1 evaluation. Utilize this time effectively by allocating resources to mitigate technical (prototype development and test) and programmatic risks.
- ☐ Work within established guidelines, as changes cost money.
- ☐ Develop complete Risk Management Process.
 - ☐ Do FMECA/Fault Tree Analysis early on
 - ☐ Identify Issues and Design the system within cost constraints.
 - ☐ Make good trade offs.
 - ☐ Develop redundancy where it makes the most sense given the budget and the design issues.
- ☐ Develop and maintain good margins.



PI Mode Lessons Learned

- ☐ **Every PI Mission is unique. Factors which vary from mission to mission include:**

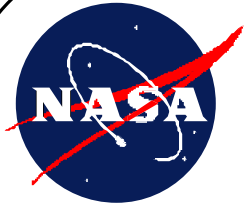
Complexity of mission and problems encountered

Experience base of PI Team

Project Management skills of PI

Receptiveness to NASA involvement

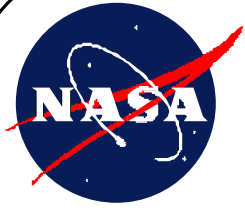
- ☐ Evaluate the ability of your team to successfully implement the mission and mitigate risks.
- ☐ Review Hardware Technology Readiness Levels. Technology readiness is extremely important, technology development does not lend itself to smaller, faster, cost capped missions, even "slight" technology advances always cost more than anticipated.
- ☐ NASA and the PI need to define, develop, negotiate and document mission management roles and responsibilities as well as any NASA technical and programmatic support needed by the mission prior to contract award.



Lessons Learned Summary



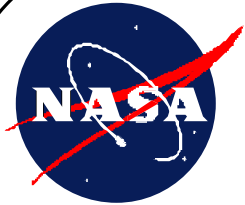
- The quality and experience of the team members is an important factor for mission success
 - System Engineering and a rigorous, well-defined system engineering process are critical to successful mission planning and development
 - NASA can augment these resources to support the missions
 - 36 - 48 Months is a SHORT TIME and \$ are very constrained; thus Technology Readiness is extremely important
 - Clear Roles, Responsibilities and Lines of Authority are Critical
 - Well defined science and mission requirements are a MUST
 - Smaller, Faster, Less Expensive Missions Must Better Understand and Proactively Manage Risk
 - Independent Peer Reviews and NASA System Level Review Process are **essential**
 - Extremely important to develop a good working relationship with the PI and his team & teamwork between all project organizations is crucial
- "Better is the enemy of good enough"



Earth Systems Science Pathfinder (ESSP) NIAT Over view

Washington Sheraton

November 15-16, 2001



NIAT Summary

- ☐ FBC encourages prudent risk.
- ☐ Risk deviation from sound principles should not be allowed.
- ☐ Efficient, Competent, Independent Review Teams and Reviews
- ☐ Experienced PM or mentoring from one to ensure insight/oversight
- ☐ Test, Test, Test
- ☐ Clear Team Roles and Responsibilities
- ☐ Maintain Adequate Margins (mass, \$\$, schedule, power)
- ☐ Develop comprehensive Test and Verification Plans
- ☐ Risk ID and Management
- ☐ Management (PI Team) accountable for policies and procedures
- ☐ TM coverage of critical events necessary imperative
- ☐ If not ready -- do not launch

[illegible]

THEME I: Developing, Supporting Exceptional People and Teams

NIAT Element	NIAT Theme	ESSP Implementation
THEME I: Developing, Supporting Exceptional People and Teams		
NIAT-1: Health and Safety	<ul style="list-style-type: none"> • Addresses stress related work environment • Identifies a need for balanced workload at NASA facilities 	Health & safety at supporting institutions compliant with NASA standards.
NIAT-2: Development of Workforce	<ul style="list-style-type: none"> • Development of team work skills for managers and supervisors • Provide mentoring from experienced NASA program and project manager • Improving opportunities and facilities for individual development 	<ul style="list-style-type: none"> • On annual basis during design and development, PI and PM attend training • PIs utilizing experienced NASA project managers and senior practitioners.
NIAT-3: Revitalizing Engineering Capability	<ul style="list-style-type: none"> • Supplement NASA technical and engineering skill development • Practical, hands- on engineering and project skills development 	utilizing experienced NASA project managers and senior practitioners.

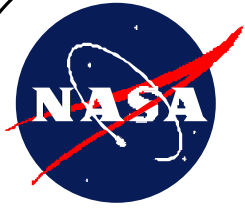
THEME II: Delivering Advanced Technology
THEME III: Understanding and Controlling Risk

THEME II: Delivering Advanced Technology	NIAT Theme	ESSP Implementation
NIAT-4: Balanced Technology Investment Strategy	<ul style="list-style-type: none"> • Provide for technology readiness and development prior to implementation into projects 	<ul style="list-style-type: none"> • Minimize new technology risk on ESSP
NIAT-5: Integrated Technology Planning Process	<ul style="list-style-type: none"> • Develop integrated technology planning process • Implement “technology push” 	<ul style="list-style-type: none"> • Minimize new technology risk on ESSP
NIAT-6: Technology Development and Infusion	<ul style="list-style-type: none"> • Deploying technology development is still a programmatic (cost and schedule) issue. 	<ul style="list-style-type: none"> • Minimize new technology risk on ESSP.
THEME III: Understanding and Controlling Risk		
NIAT-7: Risk Identification, Assessment, and Management (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> • Establishing an accurate (agreed upon) understanding of acceptable risks with success criteria • Implement reliability tools: FMECA, FTA, PRA • Establish success criteria at system and subsystem levels 	<ul style="list-style-type: none"> • Supplement proposed FMECA with FTA, PRA and RBD analyses for instrument, system and subsystems. Provide additional reliability engineering and analysis. Develop a detailed, formal Risk Management Plan.
NIAT-8: Safety and Mission Assurance (SMA) (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> • Provide appropriate level of SMA involvement (surveillance; lessons learned; problems, anomalies and incident reporting) 	Detail a list of additional quality assurance support – independent surveillance and quality checks, incorporation of lessons learned throughout lifecycle, and review of problem/incident reports.

THEME IV: Ensuring Formulation Rigor and Implementation Discipline

THEME IV: Ensuring Formulation Rigor and Implementation Discipline	NIAT Theme	ESSP Implementation
NIAT-9: Software Development and Assurance	<ul style="list-style-type: none"> • Software is a difficult challenge for mission success • NASA to be proactive on software development, ensuring software quality and reliability • NASA initiative to address process improvement, metrics enhanced verification and validation 	<ul style="list-style-type: none"> • Provide for software IV&V team support throughout project lifecycle. • Changes from baseline: Increase the level of software V&V effort for the ground and C&DH flight software environments
NIAT-10: Integrated Review Process (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> • Inadequate reviews is a central theme in ‘mishap’ reports • Reviews require “rigorous discipline” with a “comprehensive program of thorough technical and programmatic reviews” • Choice and continuity of review panel is critical and important • Reviews are a resource 	<ul style="list-style-type: none"> • Incorporate supplemental reviews throughout the project lifecycle as an integrated review process • Utilize Acceptance Reviews at the buy-off of major component Engineering Peer Reviews at subsystems and instrument level; and Independent Reviews Thorough control and closure of formal review action item.
NIAT-11: Ensuring Adequate Resources (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> • Provide adequate and reliable funding and schedule reserves throughout lifecycle • Reserves and margins must be balanced with the project risks • Project manager (PI) controls reserves and margins 	<ul style="list-style-type: none"> • Review project technical and schedule risks & adjust, revise cost reserves. • Incorporate formal evaluation in Risk Mgt Plan to assess adequate funding and schedule reserves • Ensure 20% reserve on C/D costs

NIAT-12: Faster, Better, Cheaper	<ul style="list-style-type: none"> Promotes acceptance of prudent mission risk to safely accomplish bold mission objectives (better), while conserving time and money (faster, cheaper) 	<ul style="list-style-type: none"> Emphasize safety of public, flight crews & staff Each organization manages their commitments to responsibility & accountability
NIAT-13: Surveillance (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> PMC and Center Management assesses Project status and Risk SMO assists PMC in surveillance 	<ul style="list-style-type: none"> PM & SM delegated to provide detailed project status/risks and increase communications to Earth Explorers MM and Code 300/SMO Closer tracking and more GSFC insight into project
NIAT-14: Verification and Validation (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> Verification includes all aspects of hardware, software development Higher level approval of V&V plans constitutes agreement of methods and approach 	<ul style="list-style-type: none"> Provide independent audits of V&V planning during development Changes from baseline: Add V&V planning to Peer Reviews
NIAT-15: Management Responsibility and Accountability (GSFC/Code 300 NIAT Element, ref. NIAT Assessment for GSFC Projects)	<ul style="list-style-type: none"> In the PI mission mode, overall success of the project including mission success, scientific integrity and safety is the responsibility of the Principle Investigator (PI). PI is accountable to NASA/HQ, AA/OSS for scientific success, to GSFC Center Director (&PMC) for programmatic success 	<ul style="list-style-type: none"> Provide enhanced management communications to AA/OES and GSFC PMC. Changes from baseline: PI and Co-I's frequently visit AA/OES, and Project management (GSFC resident) will address Earth Explorers Program Office and PMC concerns on a monthly basis



For More information:



ESSP related Webpages:

- ☐ The ESSP Project Library Page:
<http://essp.gsfc.nasa.gov/library.html>
- ☐ The Earth Explorers Page:
<http://earthexplorers.gsfc.nasa.gov/index.html>